higher conductivity and thermal capacity in its interior than in its crust, its age may be enormously greater than previous calculations have allowed.

The question being *sub judice*, we must wait until it is settled. But there seems at present every prospect that the physicists will concede not merely the 100 millions of years with which the geologists would be quite content, but a very much greater extent of time.

ARCH GEIKIE.

NOTES.

THE second of the special meetings of the Royal Society is announced for the 28th inst., when Prof. Weldon will bring forward as a subject for discussion, "Variation in Animals and Plants."

A SUM of 12,000 francs (£480) was voted to the Mont Blanc Observatory by the French Chamber on Tuesday.

PROF. HENRY A. ROWLAND has recently been elected a Foreign Member of the Reale Accademia dei Lincei of Rome, in the section of Physics.

THE death is announced of the Marquis de Saporta, the eminent botanist, at Aix. He was a Correspondent of the Section of Botany of the Paris Academy of Sciences.

MR. REGINALD STUART POOLE, late Keeper of Coins at the British Museum, died on Friday last, in his sixty-third year. Few men have done so much as he to extend the study of Egyptology and antiquities, or have added more to these branches of knowledge. Before he was seventeen years of age he wrote a series of articles on Egyptian chronology, which afterwards appeared in book form under the title "Horæ Ægyptiacæ." He began very early to lecture on Egyptology and numismatics, and in May 1864 made his first appearance in a Friday evening lecture at the Royal Institution. In 1877 he became Keeper of Coins, and during his twenty-two years' tenure of that post he saw through the press thirty-five most valuable catalogues of the collections under his charge. He was the author of the "Cities of Egypt," and of the articles on "Egypt," "Hieroglyphics," and "Numismatics," in the "Encyclopædia Britannica." With Miss Amelia B. Edwards, he was one of the founders of the Egypt Exploration Fund, of which he remained the honorary secretary to his death.

A NEW scientific society, composed chiefly of the professors and assistants in the Paris Natural History Museum, has just been founded. The society owes its existence to Prof. Milne-Edwards, the eminent director of the museum. It is proposed to hold monthly meetings, and to issue a *Bulletin des Naturalistes*, dealing with natural history matters.

THE Manchester Literary and Philosophical Society is fortunate in having Mr. Henry Wilde, F.R.S., for its president. Always one of the best of provincial societies, its usefulness is likely to increase, for Mr. Wilde has intimated his intention to endow the Society with the sum of eight thousand pounds, the annual income from which is to be devoted to various purposes in connection with its work.

THE history of the Museum of the Corporation of London, in the Guildhall, has never been written, although the collections housed therein are of very considerable interest and value. Taking occasion of the visit of the Essex Field Club on Saturday next, Mr. C. Welch, the Curator, will read a paper on the "Origin and Progress of the Guildhall Museum," to remedy this defect. The museum deserves to be better known and better housed than it is at present. A museum fully illustrating the ancient history of London might easily arise from the present collections, and would be a worthy object for achievement for the richest Corporation in the world.

THE Société Technique de l'Industrie du Gaz en France offers several prizes in connection with the Congress to be held during the present year. The *Journal* of the Society of Arts says that the prizes open to all include one of 10,000 francs (£400) offered to the inventor of an incandescent gas-burner showing marked superiority, to be handed in to the Society before April 1 in the present year, unless the committee exercise their power of extending the period for another year. The sum of 8000 francs (£320) will be devoted to various prizes to be awarded to the authors of the best papers on some subject connected with the gas industry, such as the mechanical *manutention* (handling) of coals, cokes, and the various substances used in gasworks, a study of water-gas, and the substitution of hydro-carbons for cannel coal. The papers must be written in French, and not bear the name of the author; but they must contain at the commencement a motto, which must be reproduced on a sealed envelope containing a declaration, signed by the author, that his work is unpublished, and that he will not make any other publication on the same subject within a year. The manuscripts, with sealed envelope, must be sent to the Society, 65 Rue de Provence, Paris, at least forty days before the period fixed for the Congress.

DURING the past week the severe frost has continued over the whole of these islands, and heavy falls of snow have occurred in all three countries. The distribution of pressure has been generally anticyclonic, biting easterly winds, and gales on our coasts. The following are a few of the lowest shade minima published in the *Daily Weather Report* of the Meteorological Office, since we last went to press:—

February	7	8	9	10	11	12	13
Nairn	0°	6°	5°	4°	3°	13°	5°
Loughborough	2	−5	−4	−1	1	4	2
London	12	10	11	13	20	14	15
Cambridge	6	6	7	7	13	15	15

In the neighbourhood of the metropolis some very low readings were recorded on the 8th instant: Wallington 2°·1, Croydon 5°·5, Tulse Hill 6°, Greenwich 6°·9; and in other parts of the country the following minima have been observed: −12° at Braemar, −8° at Stamford on the 8th, −5° at Glenlee on the 9th, and a still lower reading, viz. −17°, is said to have been observed at Braemar on the 11th instant. The reading of 6°·9 at Greenwich is the lowest but one in the last 50 years, a temperature of 6°·6 having been recorded on January 5, 1860. There had been no reading there lower than 10° in February during the same period, until the present frost, in which lower temperatures have occurred on two successive nights. In London such low temperatures rarely occur; a minimum of −5° was observed by Luke Howard on February 9, 1816. Another feature of the present frost has been the low daily maxima. On the 9th instant it did not exceed 20° at Tulse Hill. At Greenwich the maximum temperature on January 5, 1894, was 19°, which was then the lowest maximum observed there since 1841.

IN a paper read before the British Medical Association in 1889, Dr. A. C. Miller pointed out that, under certain circumstances, advantage might be derived from high level residence in the treatment of tuberculous conditions. A note, which has a bearing upon this view, is contributed by him to the *British Medical Journal*. The observers at the meteorological station on the summit of Ben Nevis are changed every three months or so. While on duty at the observatory, they are, as a matter of course, exposed to the rigours and inclemencies of the climate on the top of the mountain, and are thus subject to conditions that, *prima facie*, might be expected to favour the occurrence of catarrhs and inflammations. But experience shows quite a different result. The observatory staff while in actual residence on the summit has been remarkably free from all kinds of ailments during the eleven years that have elapsed since the opening. The subsequent residence at low level, however, renders the members of the staff peculiarly liable to an affection which closely resembles, in most of its features, what is usually recognised as an influenzal catarrh. There seems little room for doubt that this condition is due to germ influences in the lower atmosphere. At the summit of the mountain organisms do not exist, or if they do exist, only in innocuous numbers. At the low level they relatively thrive, and, seizing upon the "virgin soil" of a renewed and susceptible mucous surface, they set up the phenomena described.

IN the January and February numbers of the *Geological Magazine*, Mr. E. P. Culverwell criticises severely the astronomical theory of the Ice Age. He concludes that the change in the distribution of the solar heat received by the earth during a period of maximum eccentricity, would not cause a shifting of the isotherms as great as the displacements to which the course of existing isotherms is subject from purely geographical causes. If this is correct, the eccentricity theory of the Ice Age must be abandoned. As a possible alternative theory, Mr. Culverwell suggests a variation in atmospheric pressure through interchange of gases during the earth's passage through space.

SOME interesting additions to Palæobotany are being made by Japanese geologists. In a recent paper (*Journ. Coll. Sci., Imp. Univ., Japan*, vol. vii. part iii. 1894), Prof. Yokoyama gives the results of his study of the fossil plants from several localities on the outer or convex side of that remarkable island. Unlike the plant-bearing beds of the inner, concave side, which, so far as is known, are all Middle Jurassic, the strata from which the flora in question comes appear to be comparable in age to the Wealden of our own country. In the same number, Mr. Nishiwada records the occurrence in Japan of a Tertiary (probably Miocene) limestone with abundant remains of the peculiar calcareous alga or "nullipore," *Lithothamnion*.

PROF. A. ISSEL and Dr. G. Agamennone, who were deputed by the Italian Government to investigate the Zante earthquakes of 1893, have recently issued a valuable report of more than two hundred quarto pages (*Ann. dell' Uff. Cent. di Met. e Geod.* vol. xv. part i.: Rome, 1894). Dr. Agamennone contributes a catalogue of the earthquakes felt in Zante from the earliest times until 1893, and some general remarks on the same, as well as chapters on the relation between the shocks of 1893 and the contemporaneous geodynamic phenomena in Italy, and on the velocity of propagation of the principal shocks. Prof. Issel describes the geology of the island, relates in some detail the features of the recent earthquakes, and concludes the work with a chapter of theoretical considerations.

IN a former note (p. 232), a brief description was given of a remarkable group of earthquake-pulsations recorded at several Italian observatories, and at Nicolaiew on October 27, 1894. It was supposed that these might have proceeded from the great earthquake which occurred on the same day in Chili and the Argentine Republic. The doubt which formerly existed about the time of the shock is now removed by the receipt of detailed accounts. The first pulsations were registered at Rome at 9h. 7m. 35s. p.m., (Greenwich mean time, while the shock was recorded at the observatory of Santiago (Chili) at 8h. 50m. 26s., *i.e.* 17m. 9s. earlier. There can thus be little doubt as to the origin of the pulsations, which probably travelled with a velocity of nearly 11 k.m. per second.

A SIMPLIFIED process for silvering glass is described by MM. Auguste and Louis Lumière in the *Journal de Physique*. Take 100 parts by volume of a 10 per cent. solution of nitrate of silver, and add, drop by drop, a quantity of ammonia, just sufficient to dissolve the precipitate formed, avoiding any excess of ammonia. Make up the volume of the solution to ten times the amount by adding distilled water. The reducing solution used is the formaldehyde of commerce. The 40 per cent. solution is diluted to a 1 per cent. solution. The glass to be silvered is polished with chamois leather, and the bath is made up immediately before use, by mixing two parts by volume of the silver solution with one of formaldehyde. The solution must be poured right over the surface without stopping. After about five or ten minutes, at a temperature between 15° and 19° C., all the silver in the solution is deposited on the glass in a bright layer, which is then washed in running water. It is then varnished if the glass side is to be used, or polished if the free surface is required for reflection. This method does not require the scrupulous care necessary with other methods, but Brashear's process, for instance, gives mirrors which do not require polishing.

THE Government of Cape Colony has recently instituted inquiries in various quarters with a view to gain suggestions as to the best methods of developing the neglected sea-fisheries of the colony. The Minister of Agriculture has received a number of replies upon the subject, which have been published in the *Agricultural Journal* of Cape Colony. The first desideratum in a matter of this important nature is clearly that the Government should possess some trustworthy and responsible source of information upon matters connected with its sea-fisheries; and on this account Dr. Trimen, the Curator of the South African Museum, strongly recommends the Government to obtain the services of a competent naturalist, accustomed to the study of marine animals and, if possible, experienced in the work of English or American Fishery Departments, who would devote himself to a thorough study of South African Fisheries. The appointment of skilled naturalists as Fishery Advisers to Governments has been attended with excellent results in Holland and other countries, and we heartily endorse all that Dr. Trimen has to say in favour of the adoption of a similar course in the present instance.

MESSRS. LAWS AND ANDREWES have not finished their vindication of the innocuous nature of sewer air. We thought that from the microbic point of view this question had been disposed of; but the London County Council evidently think differently, and another report is to hand, telling us that the microbes present in sewage are not present in sewer air, and that there is no microbic relationship, either in quantity or quality, between the two. These investigators claim to have found a bacillus resembling the typhoid bacillus in a drain from the typhoid block of a fever hospital in which no disinfection had been carried out for two days previously. This is hardly "an important fact," and perhaps not an unexpected discovery; but it is interesting to note that when typhoid germs are placed in sterile sewage, they are said to succumb rapidly, whilst the closely allied *B. coli communis* multiplies extensively. Details are given as to how the sewage was sterilised; but whether culture material was introduced along with the respective organisms, is not mentioned. We fail to understand why the colon bacillus is described as "harmless"; it has been shown to possess very distinct pathogenic properties. Experiments were conducted to ascertain what effect certain sewage microbes would have on the vitality of the typhoid bacillus in sterile sewage, whether the demise of the latter would be hastened or retarded by their presence. In these investigations we are informed that the respective microbes were inoculated into the sewage *direct from broth cultures*, so that we cannot accept the results obtained as representative. It has been repeatedly shown what an effect the presence of even minute traces of culture material has on the vitality of particular microbes in water, &c., and what confusing and conflicting results have been obtained by different observers working with the same microbe through neglect of this simple precaution. It is to be hoped that if any further experiments in this direction are contemplated, Messrs. Laws and Andrewes will bear this fact in mind.

The inaugural lecture "On the Present Relations of Agricultural Art and Science," delivered by Prof. R. Warington, F.R.S., in the University Museum, Oxford, on the 4th inst., has been published by Mr. Henry Frowde. By a few statements of fact, the Sibthorpian Professor shows that the agricultural industry can only be placed upon a sound basis by the full adoption of scientific methods and the recognition of research. It is very well known that the provision for agricultural investigations in England is at present wholly inadequate. We have the important experiment station at Rothamsted, and the Royal Agricultural's Society's station at Woburn. Experiments are also carried on at some of our agricultural colleges; but this represents practically all that is being done here for the elucidation of agricultural problems. Compare this with the provision made in other countries. "In the German Empire alone there are fifty-four agricultural experiment stations, besides numerous public laboratories for the analysis of manures, and seed testing. The experiment stations are supported by aid from the State. The whole number of experiment stations on the continent of Europe is about 190. There are besides these, about 120 public laboratories devoted to special kinds of agricultural work. In the United States, a great effort has recently been made to provide the whole country with experiment stations. Every State in the Union has now at least one station, supported, since the year 1887, with an annual income of about £3000 paid to it by the nation. The total number of experiment stations in the United States is at present fifty-five . . . the practical working out of agricultural problems can only be accomplished by the establishment among us of a considerable number of experiment stations; only in this way can science be brought into touch with practices, and the teachings of science reduced to that concrete form in which they can be put to profitable use by the farmer. Why should not our County Councils found and maintain an agricultural experiment station in each county? Such a station would become a centre of light and teaching to a large district."

The *Proceedings* of the eleventh annual convention of the Association of Official Agricultural Chemists, just distributed by the U.S. Department of Agriculture, enforces the remarks referred to above. The volume is literally full of facts relating to agricultural chemistry. It contains many original articles, abstracts of papers, analyses of fertilisers, foods, soils, and farm products, and numerous reports. Unfortunately, the results of such investigations in the United States are not fully applicable to British agriculture. What is wanted, as Prof. Warington points out, is a central agricultural laboratory in England, having as one of its duties the preparation of chemical agricultural statistics. When this has been established for a few years, agriculturists will not have to confess that they know more about the composition and properties of German and American produce than they do of similar products in our own country.

The tenth of the Alembic Club Reprints, published by Mr. W. F. Clay, Edinburgh, contains Graham's most valuable contribution to pure chemistry, viz., the paper read before the Royal Society in 1833, entitled "Researches on the Arseniates, Phosphates, and Modifications of Phosphoric Acid."

All that is readable about comets is to be found in Mr. Thynne Lynn's "Remarkable Comets" (Edward Stanford), the third edition of which has just been published. Though but a slender brochure of less than fifty pages, this little treatise comprises most of the interesting facts in the history of cometary discovery.

The new illustrated catalogue of electrical and other apparatus, just published by Messrs Elliott Brothers, is capable of giving the student of elementary science a liberal education in scientific instruments. Almost every important piece of apparatus used in electricity is illustrated in the catalogue, as well as the tools of research and education in other branches of physical science.

The Calendar of the Department of Science and Art, for 1895, has been issued. For the benefit of those unfamiliar with this publication, it may be worth mention that the Calendar comprises a history and general description of the whole Department, with a summary of the rules, and a list of the Science and Art Schools and Classes, containing the number of students in each school and in each subject.

In the *Bulletin* of the College of Agriculture of the Imperial University of Japan (vol ii. No. 3), Prof. Sasaki gives a full description of the scale insect of mulberry trees (*Diaspis patelliformis*, n. sp.) and of the principal features of its life-history. A great deal of damage seems to be done by this insect pest; and it would be well if tree-owners in Japan would make use of the simple remedial measures recommended by Prof. Sasaki. The *Bulletin* also includes a paper on the spermatogenesis of the silkworm by K. Toyama.

In 1881, the first edition of "Elementary Lessons in Electricity and Magnetism" (Macmillan), by Prof. S. P. Thompson, F.R.S., was published. Since then the book has been reprinted, with alterations and additions, many times, and an entirely new edition has now been issued. We are reminded in the preface that during the fourteen years which have elapsed since the book first appeared, electrical science and the science of magnetism have been greatly advanced. Striking progress has been made in theory and in practice, and the expansion of knowledge has necessitated an expansion of the book. Whoso seeks a class-book on electricity and magnetism, containing an elementary exposition of recent work, will find their want supplied by Prof. Thompson's Lessons.

In *Science Progress* for February, Dr. C. S. Sherrington F.R.S., describes the varieties of leucocytes. Mr. A. C. Seward concludes his second contribution on the structure and formation of coal, with a paragraph which expresses his conviction that "the weight of evidence seems to tip the balance of opinion very materially towards the theory of drifting and subaqueous sedimentation, for the majority of the Palæozoic coal seams." An account of the researches on the methods of digestion in Cœlenterates, is given by Prof. S. J. Hickson; Dr. W. F. Hume reviews works on geological folds and faulting; and Mr. Philip Lake adds to the literature of tectonic geology, a paper on Neozoic—that is, Mesozoic and Cainozoic—geology in Europe.

At present the English Arboricultural Society hardly justifies its name, for it is more or less limited to the North of England. There is every prospect, however, of its extension southwards in the future, both on account of the attention now being given to forestry, and because the Society is making efforts to increase its membership by going further afield. The *Transactions* of the Society, of which we have received a recent issue (vol. iii part iv.), should materially assist towards this end; for the instructive papers contained therein appeal to all foresters. In the Part received by us, there is an essay on "How Trees Grow," by Mr. J. Maughan; an essay on "Thinning Mixed Plantations," by Mr. W. Forbes; and a paper on "The Distribution of Trees in a Wood," by Prof. W. Somerville. These are all useful contributions, but even more important is the publication of the results of an inquiry, conducted by the Society, into the disease of the Larch, a subject about which much has been written and said. The information which Prof. Somerville has brought together, forms a valuable summary of the present position of knowledge in regard to the Larch disease, and shows the various conditions and cultural methods which hold out some prospect of securing comparative immunity from attack. With a larger membership, the Society would be able to carry out, and publish, the results of many similar investigations.

PROF. SCHIFF and Dr. Tarugi describe, in a communication to the *Berichte*, an admirable substitute for the disagreeable sulphuretted hydrogen in qualitative analysis. The new reagent is the ammonium salt of thio-acetic acid, $CH_3 . COSNH_4$. Ammonium thio-acetate is decomposed by hot dilute hydrochloric acid, liberating sulphuretted hydrogen without any precipitation of sulphur. No objectionable bye-products are formed in the reaction, only sal-ammoniac and acetic acid being produced. When a feebly ammoniacal solution of ammonium thio-acetate is added to a hydrochloric acid solution of the metals of the second group, and the liquid is heated to near boiling, the metals are at once precipitated as sulphides, while only the faintest odour of sulphuretted hydrogen is perceptible. After cooling and filtering, the filtrate is found to contain no trace of the metals, not even of arsenic if an arseniate had been originally present. The completeness and rapidity of the reaction, particularly in the case of arsenic, which is usually so troublesome to precipitate from arseniates, is one of its strongest recommendations, and is described by Prof. Schiff as being perfectly surprising. A couple of cubic centimetres of a 30 per cent. solution of ammonium thio-acetate is usually ample for a gram of the substance to be analysed. The reagent has been employed for some time by Prof. Schiff in the Pisa laboratory, and is much appreciated by his students, sulphuretted hydrogen being completely excluded from the laboratory, doubtless to the material advantage of all concerned, both as regards comfort and health. Thio-acetic acid is readily prepared by acting upon glacial acetic acid with phosphorus pentasulphide. It boils at 95°, and is but slightly soluble in water. When the acid is dissolved in a slight excess of dilute ammonia, a yellow solution is obtained, which is then diluted to three times the volume of the acid originally taken—that is, 10 cubic centimetres of the acid furnish 30 cubic centimetres of the reagent. Prof. Schiff serves the reagent out to his students in small bottles closed by a cork, through which a small pipette, holding 2 cubic centimetres, is inserted, by means of which the convenient quantity of the reagent can at once be added to the hydrochloric solution of their test substance. It is scarcely necessary to add that zinc, manganese, nickel, and cobalt are not precipitated in the presence of hydrochloric acid by the new reagent, any more than by sulphuretted hydrogen itself. The sulphides of these metals are at once precipitated, however, upon rendering the solution alkaline; but as ammonium sulphide acts quite as well for this purpose, Prof. Schiff confines the use of ammonium thio-acetate to the precipitation of the metals of the second group.

THE additions to the Zoological Society's Gardens during the past week include a Lion (*Felis leo*, ♂) from India, presented by H.R.H. the Duke of Connaught; a Cape Bucephalus (*Bucephalus capensis*) from South Africa, presented by Mr. J. E. Matcham.

OUR ASTRONOMICAL COLUMN.

THE MASS OF THE ASTEROIDS.—A preliminary note on the probable mass of the asteroids was contributed by Mr. B. M. Roszel to the *Johns Hopkins University Circular* in May 1894, and summarised in these columns (NATURE, vol. l. p. 87.) In that paper Mr. Roszel limited himself to determining the mass from a study of 216 minor planets; he has now extended the computations to 311 asteroids, the orbits of which are given in the *Berliner Astronomisches Jahrbuch* for 1894 (*University Circular*, January 1895). His chief object was to find a probable limiting value for the mass, rather than an accurate determination of the mass itself. Using the photometric determinations of the diameter of Vesta, by Pickering and Müller, and the direct measures of the diameters of Ceres, Pallas, and Vesta by Barnard, Mr. Roszel has reduced the volumes of all the asteroids to the volume of Vesta, except when Barnard's measures were the basis, in which case he computed the volumes of Ceres and Pallas separately, and added them to the combined volume of the remaining 309. Assuming the albedo constant and a constant density equal to the density of Mars, he obtained the following numbers:

Combined volume of 311 asteroids . 5·185 vol. of Vesta.
,, ,, omitting Ceres and Pallas. . . 2·684 ,, ,,
Volume of Vesta, in terms of volume of Mars:
(1) From Pickering's estimate of the diameter of Vesta, assuming the albedo = albedo of Mars . . . . = 0·00022
(2) From Müller's estimate, assuming (*a*) the albedo = albedo of Mars . . . = 0·00065
(3) From Müller's estimate, assuming (*b*) the albedo = albedo of Mercury . . . = 0·00129
(4) From Barnard's estimate of the diameter of Vesta . . . . = 0·00018
Combined mass of 311 asteroids, in terms of mass of Mars:
From Pickering's estimate, as above . . = 0·00112
,, Müller's estimate, as above (*a*) . . = 0·00336
,, ,, ,, ,, (*b*) . . = 0·00666
,, Barnard's measures . . . . = 0·00273

The mean diameter of Mars was taken as 4230 miles. It appears from the above numbers that the combined mass of the asteriods is about ·026 of the mass of the moon.

THE APPARENT DIAMETERS OF MERCURY.—During the transits of Mercury on May 9, 1891, and November 10, 1894, Prof. Barnard gave special attention to measurements of the planet's apparent diameter. (*Ast. Jour.* No. 335.) In both cases the diameter in R.A. was found to be slightly greater than that in declination, and if this be not a mere accidental coincidence, as Prof. Barnard seems rather inclined to believe, it would indicate a small polar compression. The measures at the two transits respectively indicate a polar compression of 1/134 and 1/98, or a mean of 1/116. Though by no means insisting on the reality of the difference in the diameters, Prof. Barnard points out that "the results may be of great importance in the future, as bearing upon the rotation of the planet on its axis in a reasonably short period." Expressed in angular measure, reduced to unit distance, the two diameters as measured in 1894 were 6″·241 for the "equatorial," and 6″·178 for the "polar" diameter. It is incidentally mentioned that "though Mercury cannot be seen at transits with the naked eye alone, it only requires a power of 2½ diameters to make it easily visible."

THE VARIATION OF LATITUDE.—The results obtained by Mr. Chandler in his investigations of variation of latitude seem to be confirmed by M. Ivanof's recent discussion of the older series of observations made with the great vertical circle at Pulkowa. (*Ast. Jour.* No. 335). "There is no doubt that two periods subsist; one equal to 428 days, the other to a year. Also, the semi-amplitudes of both terms are variable beyond any doubt."